We Claim:

1. A method of controlling the bow and skew of a backing material fed through a tufting machine, the tufting machine having a reciprocating needle bar disposed with respect to a tufting zone through which the backing material is fed, a cloth feed roll positioned upstream of the tufting zone, a roll of backing material from which the backing material is supplied, the backing material having a plurality of elongate warp yarns extending longitudinally in the lengthwise direction of the backing material and a plurality of weft yarns extending substantially perpendicular to the warp yarns in the cross-length direction of the backing material, the method comprising:

aligning at least one elongate weft yarn marker disposed on the backing material, the at least one weft yarn marker being substantially parallel to the weft yarns of the backing material, with the needle bar so that the at least one weft yarn marker is substantially parallel to the needle bar.

2. The method of claim 1, further comprising detecting the at least one weft yarn marker on the backing material as the backing material is being passed toward the tufting zone.

3. The method of claim 2, further comprising detecting a plurality of spaced and substantially parallel weft yarn markers disposed on the backing material and spaced in the lengthwise direction thereof.

4. The method of claim 2, further comprising detecting a plurality of groups of weft yarn markers disposed on the backing material and spaced in the lengthwise direction thereof.

5. The method of claim 1, further comprising detecting whether the at least one weft yarn marker is substantially parallel to the needle bar as the backing material is passed toward the tufting zone.

6. A method of controlling the bow and skew of a backing material fed through a tufting machine, the tufting machine having a reciprocating needle bar disposed with respect to a tufting zone through which the backing material is fed, a cloth feed roll positioned upstream of the tufting zone, a roll of backing material from which the backing material is supplied, the backing material having a plurality of elongate warp yarns extending longitudinally in the lengthwise direction of the backing material and a plurality of weft yarns extending substantially perpendicular to the warp yarns in the cross-length direction of the backing material, the method comprising:

detecting at least one weft yarn marker disposed on the backing material as the backing material is being passed toward the tufting zone, the at least one weft yarn marker being substantially parallel to the weft yarns of the backing material; and

aligning the at least one weft yarn marker with the needle bar so that the at least one weft yarn marker is substantially parallel to the needle bar.

7. The method of claim 6, the step of detecting the at least one weft yarn marker comprising detecting the at least one weft yarn marker with an automated detection device.

8. The method of claim 6, the step of detecting the at least one weft yarn marker comprising manually observing the at least one weft yarn marker.

9. The method of claim 6, further comprising detecting a plurality of spaced and substantially parallel weft yarn markers disposed on the backing material and spaced in the lengthwise direction thereof.

10. The method of claim 6, further comprising detecting a plurality of groups of weft yarn markers disposed on the backing material and spaced in the lengthwise direction thereof.

11. The method of claim 6, further comprising using a bow roll positioned intermediate the cloth feed roll and the roll of backing material, and over which the backing material is at least partially passed, to increase and decrease the tension of at least a portion of the backing material.

12. The method of claim 11, further comprising using the bow roll to increase and decrease the tension of a central portion of the backing material for controlling the alignment of the weft yarns of the backing material with respect to the needle bar.

13. The method of claim 6, further comprising detecting whether the at least one weft yarn marker is substantially parallel to the needle bar as the backing material is passed toward the tufting zone.

14. The method of claim 13, further comprising positioning a bow roll intermediate the cloth feed roll and the roll of backing material, passing the backing material at least partially about the bow roll, and using the bow roll to increase and decrease the tension of at least a portion of the backing material passed thereover in response to the detection of the at least one weft yarn not being substantially parallel to the needle bar.

15. The method of claim 14, further comprising using the bow roll to increase and decrease the tension of a central portion of the backing material passed thereover for controlling any bow that may be present in the weft yarns of the backing material with respect to the needle bar.

16. The method of claim 13, further comprising mounting the roll of backing material on a pair of spaced jack assemblies positioned at the ends of the roll of backing material, and raising or lowering the respective ends of the roll of backing material independently of one another to increase or decrease the tension of at least a portion of the backing material in response to the

detection of the at least one weft yarn not being substantially parallel to the needle bar.

17. The method of claim 16, further comprising using the respective jack assemblies to increase and decrease the tension of at least one of two spaced and separate edge portions extending along the respective and separate side edge portions of the roll of backing material for aligning the weft yarns of the backing material with respect to the needle bar.

18. The method of claim 13, further comprising mounting the roll of backing material on a pair of spaced jack assemblies positioned at the ends of the roll of backing material, and selectively raising one end of the roll of backing material and lowering the other end of the roll of backing material to increase or decrease, respectively, the tension of at least a portion of the backing material in response to the detection of the at least one weft yarn not being substantially parallel to the needle bar.

19. A system for controlling the bow and skew of a backing material fed through a tufting machine, the tufting machine having a reciprocating needle bar disposed with respect to a tufting zone through which the backing material is fed, a cloth feed roll positioned upstream of the tufting zone, a roll of backing material from which the backing material is supplied, the backing material having a plurality of elongate warp yarns extending longitudinally in the lengthwise direction of the backing material and a plurality of weft yarns extending substantially perpendicular to the warp yarns in the cross-length direction of the backing material, the system comprising:

at least one weft yarn marker disposed on the backing material, the at least one weft yarn marker being substantially parallel to the weft yarns of the backing material;

at least one detection device positioned with respect to the needle bar and being constructed and arranged to detect the at least one weft yarn marker as the backing material is being passed toward the tufting zone;

a bow roll positioned intermediate the cloth feed roll and the roll of backing material, the backing material being at least partially passed thereabout; and

a controller operably coupled to the at least one detection device and the bow roll.

20. The system of claim 19, wherein the bow roll is constructed and arranged to increase or decrease the tension of at least a portion of the backing material passed thereover.

21. The system of claim 19, wherein the bow roll is constructed and arranged to increase or decrease the tension of a central portion of the backing material passed thereover

22. The system of claim 19, wherein the bow roll is constructed and arranged to be moved to increase or decrease the tension in the backing material passed thereover.

23. The system of claim 19, further comprising an actuator operably coupled to the controller and being constructed and arranged to move the bow roll with respect to the backing material to increase or decrease the tension of the backing material.

24. The system of claim 23, wherein the actuator comprises a linear actuator.

25. The system of claim 19, further comprising at least one jack assembly constructed and arranged to carry the roll of backing material.

26. The system of claim 25, the at least one jack assembly being operably coupled to the controller, and being constructed and arranged to raise and lower the respective ends of the roll of backing material independently of one another to increase and decrease the tension of the backing material passed toward the tufting zone

27. The system of claim 25, the at least one jack assembly being operably coupled to the controller, and being constructed and arranged to raise one end of the roll of backing material and to simultaneously lower the other end of the roll of backing material independently of one another to increase and decrease the tension of the backing material passed toward the tufting zone.

28. The system of claim 19, further comprising a spaced pair of jack assemblies positioned at the ends of the roll of backing material, each of the jack assemblies being constructed and arranged to carry an end of the roll of backing material.

29. The system of claim 28, each of the jack assemblies being operably coupled to the controller and being selectively instructed by the controller to raise or lower the respective ends of the roll of backing material independently of one another to increase or decrease the tension of at least a portion of the backing material passed toward the tufting zone.

30. The system of claim 28, each of the jack assemblies being operably coupled to the controller, each of the jack assemblies being constructed and arranged to raise and lower the respective ends of the roll of backing material independently of one another to increase or decrease the tension of at least a portion of the backing material passed toward the tufting zone.

31. The system of claim 30, wherein the respective jack assemblies increase and decrease the tension of at least one of two spaced and separate edge portions extending along the respective and separate side edge portions of the backing material passed from the roll of backing material toward the tufting zone.

32. The system of claim 19, the at least one weft yarn marker comprising a plurality of parallel weft yarn markers disposed on the backing material and spaced from one another in the lengthwise direction of the backing material.

33. The system of claim 19, the at least one weft yarn marker comprising further comprising a series of parallel weft yarn marker groups disposed on the backing material and spaced from one another in the lengthwise direction of the backing material.

34. The system of claim 19, wherein the at least one detection device is positioned downstream of the cloth feed roller.

35. The system of claim 19, the at least one detector comprising a plurality of detectors spaced from one another in the weft direction of the backing material and being positioned parallel to the needle bar.

36. The system of claim 19, the at least one detector being selected from at least one of the detectors in the group of detectors comprising optical, laser, magnetic, electronic, infra-red, and ultrasonic detectors.

37. The system of claim 19, the at least one weft yarn marker being selected from at least one of the markers in the group of markers comprising optical, laser readable, magnetic, electronic, infra-red, and ultrasonic markers.

38. The system of claim 19, further comprising at least one jack assembly constructed and arranged to carry the roll of backing material, wherein the controller selectively instructs a first actuator operably coupled to the bow roll to move the bow roll against the backing material supply, and instructs at least one second actuator operably coupled to the at least one jack assembly to raise and lower at least one end of the roll of backing material, respectively, to selectively increase and decrease the tension of the backing material being passed toward the tufting zone in response to the detection of the at least one weft yarn marker not being substantially parallel to the needle bar.

39. The system of claim 19, further comprising a second bow roll spaced from said bow roll and also being positioned intermediate the cloth feed roll and the roll of backing material, the second bow roll being operably coupled to the at least one detection device and the controller.

40. A system for controlling the bow and skew of a backing material fed through a tufting machine, the tufting machine having a reciprocating needle bar disposed with respect to a tufting zone through which the backing material is fed, a cloth feed roll positioned upstream of the tufting zone, a roll of backing material from which the backing material is supplied, the backing material having a plurality of elongate warp yarns extending longitudinally in the lengthwise direction of the backing material and a plurality of weft yarns extending substantially perpendicular to the warp yarns in the cross-length direction of the backing material, the system comprising:

at least one elongate weft yarn marker disposed on the backing material, the at least one weft yarn marker being substantially parallel to the weft yarns of the backing material;

at least one detection device positioned with respect to the needle bar and being constructed and arranged to detect the at least one weft yarn marker as the backing material is passed toward the tufting zone;

a bow roll positioned intermediate the cloth feed roll and the roll of backing material, the backing material being at least partially passed thereabout, wherein the bow roll is constructed and arranged to increase and decrease the tension of the backing material passed toward the tufting zone;

at least one jack assembly positioned with respect to the roll of backing material, the at least one jack assembly being constructed and arranged to carry the roll of backing material thereon and being constructed and arranged to raise and lower the respective ends of the roll of backing material independently of one another to increase and decrease the tension of the backing material passed toward the tufting zone; and

a controller operably coupled to the at least one detection device, the bow roll, and the at least one jack assembly, respectively.

41. The system of claim 40, wherein the controller selectively instructs a first actuator operably coupled to the bow roll to move the bow roll against the backing material, and instructs at least one second actuator operably coupled to the at least one jack assembly to raise and lower at least one end of the roll of backing material, respectively, in response to the detection of the at least one weft yarn marker not being substantially parallel to the needle bar.

42. The system of claim 40, wherein the controller is automated.

43. The system of claim 40, wherein the controller is manually operated.

44. A system for controlling the bow and skew of a backing material fed through a tufting machine, the tufting machine having a reciprocating needle bar disposed with respect to a tufting zone through which the backing material is fed, a cloth feed roll positioned upstream of the tufting zone, a roll of backing material from which the backing material is supplied, the backing material having a plurality of elongate warp yarns extending longitudinally in the lengthwise direction of the backing material and a plurality of weft yarns extending substantially perpendicular to the warp yarns in the cross-length direction of the backing material, the system comprising:

at least one elongate weft yarn marker disposed on the backing material and being substantially parallel to the weft yarns of the backing material;

at least one detection device positioned with respect to the needle bar and being constructed and arranged to detect the at least one weft yarn marker as the backing material is being passed toward the tufting zone;

a bow roll positioned intermediate the cloth feed roll and the roll of backing material, the backing material being at least partially passed thereabout, wherein the bow roll is constructed and arranged to increase and decrease the tension of the backing material passed toward the tufting zone;

a jack assembly positioned at each respective end of the roll of backing material, each of the jack assemblies being constructed and arranged to carry an end of the roll of backing material and to raise and lower the respective ends of the roll of backing material independently of one another to increase and decrease the tension of the backing material passed toward the tufting zone; and

a controller operably coupled to the at least one detection device, the bow roll, and to each respective jack assembly.

45. The system of claim 44, wherein the controller selectively instructs a first actuator operably coupled to the bow roll to move the bow roll, and selectively instructs one or both of a pair of second actuators operably coupled one each to one of the respective jack assemblies to raise and lower at least one end of the roll of backing material independently of one another.

46. A system for controlling the bow and skew of a backing material fed through a tufting machine, the tufting machine having a reciprocating needle bar disposed with respect to a tufting zone through which the backing material is fed, a cloth feed roll positioned upstream of the tufting zone, a roll of backing material from which the backing material is supplied, the backing material having a plurality of elongate warp yarns extending longitudinally in the lengthwise direction of the backing material and a plurality of weft yarns extending substantially perpendicular to the warp yarns in the cross-length direction of the backing material, the system comprising:

a plurality of closely spaced and substantially parallel weft yarn markers disposed on the backing material and formed as a group of weft yarn markers, each of the weft yarn markers within the group being spaced from one another in the lengthwise direction of the backing material and being substantially parallel to the weft yarns of the backing material;

at least one detection device positioned with respect to the needle bar and being constructed and arranged to detect the weft yarn markers as the backing material is being passed thereby and toward the tufting zone;

a bow roll positioned intermediate the cloth feed roll and the roll of backing material, the backing material being at least partially passed thereabout, the bow roll being constructed and arranged to increase and decrease the tension of the backing material passed thereover;

at least one jack assembly constructed and arranged to carry the roll of backing material thereon and to raise and lower the respective ends of the roll of backing material independently of one another to increase and decrease the tension of the backing material passed toward the tufting zone; and

a controller operably coupled to the at least one detection device, the bow roll, and the at least one jack assembly, respectively.

47. A method of controlling the bow and skew of a backing material fed through a tufting machine, the tufting machine having a reciprocating needle bar disposed with respect to a tufting zone through which the backing material is fed, a cloth feed roll positioned upstream of the tufting zone, a roll of backing material from which the backing material is supplied, the backing material having a plurality of elongate warp yarns extending longitudinally in the lengthwise direction of the backing material and a plurality of weft yarns extending substantially perpendicular to the warp yarns in the cross-length direction of the backing material, the method comprising:

visually detecting at least one weft yarn marker disposed on the backing material as the backing material is being passed toward the tufting zone, the at least one weft yarn marker being substantially parallel to the weft yarns of the backing material; and

aligning the at least one weft yarn marker with the needle bar so that the at least one weft yarn marker is substantially parallel to the needle bar.

48. The method of claim 47, further comprising manually controlling a bow roll intermediate the cloth feed roll and the roll of backing material, and manually controlling at least one jack assembly constructed and arranged to support the ends of the roll of backing material to align the at least one weft yarn marker with the needle bar.